Disclosures

- Carole Lewis, Paul Frizelle, and Linda McAllister lecture for Great Seminars and Books and receive speaking fees.
- Carole Lewis lectures for Great Seminars Online and receives speaking fees and she owns both of the above companies.
- Carole Lewis is a Co-Editor for the book Physical Therapy for the Older Adult and receives royalties.

Objectives: Upon completion of this session, participants will be able to

- Describe changes in the US population how it will impact delivery of care to older adults in the outpatient setting.
- Compare and contrast evidence-based functional tools that are effective and quick to use with older adults in an outpatient setting.
- Select and perform evidence-based interventions effective for older adult patients experiencing back pain, hip fracture, gait and balance dysfunction, and weakness.
- Analyze a case study using evidence-based examinations and interventions specific to an outpatient setting.

Presentation Outline

- Introduction: 10 minutes
- Tools of the trade: Best functional examination tools for back pain, hip fracture, gait and balance and weakness for older adults: 40 minutes
- Latest EBP strategies for older adults with diagnoses of back pain, hip fracture, gait and balance and weakness: 40 minutes
- Case study illustrating the best care for Medicare patients: 10 minutes
- Q and A: 20 minutes
Uniqueness of Working with Older Persons

- More chronic conditions
- More leisure time
- Program duration & length
- Admitting a problem
- Motivation
- What we bring to the table

Motivational Interviewing

- Ask permission
- Open ended questions
- Reflective listening
  - LISTEN and repeat back what you are hearing
  - Have a conversation
  - Push/pull
- Summarize and state an action step

Age Bias: Therapists and Older Patients; Kvitek; J of Gero; 86;

- 128 therapists received case studies
- Half got 28 y/o and half a 78y/o
- Therapists were significantly less aggressive with the 78y/o
Dedicated Courses in Geriatrics versus Pediatrics in Entry-level Physical Therapy Programs; Lewis, Geri-17

- 64% had a course in pediatrics
- 42% had a course in geriatrics
- Many of those schools with programs in geriatrics began them in the last few years
- Pediatric programs were in place much longer

Mean percentage of patient care time spent per week with patients in each age group

<table>
<thead>
<tr>
<th>Facility</th>
<th>Children</th>
<th>Adults</th>
<th>Older Persons</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acute care hospital</td>
<td>9.5</td>
<td>38.6</td>
<td>51.8</td>
</tr>
<tr>
<td>Sub-acute rehab hospital</td>
<td>7.0</td>
<td>39.3</td>
<td>53.6</td>
</tr>
<tr>
<td>Hospital-based outpatient facility</td>
<td>15.6</td>
<td>53.1</td>
<td>31.3</td>
</tr>
<tr>
<td>Private practice</td>
<td>15.1</td>
<td>57.5</td>
<td>27.4</td>
</tr>
<tr>
<td>SNF/ECF/ICF</td>
<td>2.6</td>
<td>15.1</td>
<td>82.2</td>
</tr>
<tr>
<td>Home care</td>
<td>20.3</td>
<td>19.8</td>
<td>60.0</td>
</tr>
</tbody>
</table>

Source: APTA Practice Profile, 2006

Some Objective Measures

- **Hamstrings Range of Motion**
  - L – 56 degrees, R – 85 degrees
- **STRENGTH**
  - Hip Abduction
  - R – 28# L – 32#, norm – 38#
  - Knee Extension
  - R – 36#, L – 41#, norm – 50#
  - Knee Flexion
  - R – 32#, L – 19# (limited by pain), norm – 35#  
  - Plank
  - 73 sec; norm for 60-79 = 124 sec
  - Back Extension
  - 75 sec; norm w/o back pain = 128 sec
- **Sock Test**
  - 3 bilaterally
- **Static Balance**
  - OLST: R – 3 sec, L – 9 sec
  - Tandem eyes closed – 0 steps,
  - Tandem eyes open – 5 mistakes
- **Endurance**
  - 2MST – 111- (norm 93)
- **TUG**
  - 6.5 (norm 5.6)
- **STS**
  - 11 times (norm 15)
Aging and Back Pain

- US National Prevalence and Correlates of Low Back Pain Among Adults; Strine; *Arthritis & Rheum*, 2007
  - Over 65 years = 20 million

Aging and Low Back Pain


- Beliefs about age-related inevitability of restricting back pain
- Negative attitudes toward medication and or surgery
- Perceived importance of restricting back pain relative to other co-morbidities

Trunk Muscle Characteristic of Older Adults With and Without Low Back Pain; Sions; *JOSPT*, 2017

- Older Adults with low back pain had a ↓ erector spinae muscle mass when compared to participants without low back pain
- No interactions were found between the psoas and quadratus lumborum

Examination

- Oswestry
- Testing the Core
- Measuring Hamstrings
Why Paper and Pencil?

- Fast
- Reliable
- Valid
- MCID
- Sometimes clearer answers

Oswestry Disability Questionnaire

- French study: identified 19 scales – concluded that 4 tools demonstrated strong validity, feasibility, and reliability
  - Oswestry Low Back Pain Disability Questionnaire
  - Roland Disability Pain Questionnaire
  - Quebec Back Pain Disability Scale
  - Dallas Pain Questionnaire
- MCID: 6 points; Fritz; PT 2001

Is the core important for patients with low back pain?

- Do you test it?
- What tests do you use for your older patients?


- **Extension**: Small pillow above ASIS and lift sternum off table and hold
  - Men: 208 seconds
  - Women: 128 seconds
- **Flexion**: Lift shoulder blades off the table; hands can be across chest
  - Men: 182 seconds
  - Women: 85.1 seconds
The prone bridge test: performance validity and reliability among older adults; Bohannon; J of Bodywork; 2018
- Mean prone bridge: 145 seconds
- 60-79 years old
  - men: 127 sec
  - Women: 124 sec

A Clinical Tool for Office Assessment of Lumbar Spine Stabilization Endurance; Schellenberg; AmJPMR; 6-07
- Bridging maneuvers seem to be reliable, valid and practical
- Prone = core stabilizers = 75 seconds
  - Pts with LBP= 28seconds
- Supine bridge= core extensors = 170 seconds
  - Pts with LBP= 76 seconds

Interventions with a focus on lumbar stenosis (LSS)

AP diameter of the dural sac is decreased by extension (normally extension decreases AP diameter 9%, in people with LSS it is decreased 67%)

Widening of the lumbar canal with relief of symptoms occurs with flexion

Pua YH, et al. Treadmill walking with body weight support is no more effective than cycling when added to an exercise program for lumbar spinal stenosis: RCT. Aust J Physiother. 2007

- 68 participants; mean age 60 in both groups
- Received heat flexion exercises and traction
- Both groups – equal improvement
  - Group 1: unweighting treadmill walking
  - Group 2: cycling
    - Cycling protocol: 30 minutes, 2x/ week for 6 wks
      - Weeks 1 & 2: cycle comfortable pace
      - Week 3-6: moderate intensity
      - Cycle flexed posture – avoid lumbar extension

Backstrom, Man Ther. 2011

- Program
  - 40 min / 5 days / week for 4 weeks of manual therapy and exercises
- Man RX to hip and back
  - Hip mobs all directions
  - Thoracic mobs
  - Side lying lumbar rotation
  - Hip flexor stretch

Exercises
1. Single and double knee to chest exercise
2. Lumbar rotation
3. Iliopsoas
4. Rectus stretch
5. Thoracic extension self-mobilization
6. Lower abdominal strengthening exercise
7. Hip abduction strengthening exercise

An Extensive Literature Review of Lumbar Multifidus: Biomechanics; Kay; Jof Man&ManTher; 01

- Exercises that cause the highest co-contraction for stabilization
  - Isometric resisted seated trunk rotation

Partial sit ups generated the highest muscle challenge to spine cost indices – generating the greatest contraction with the lowest spinal compression load.


- Compared Yoga Laughter (YL) to crunch and back lift
- Internal obliques higher with YL
- Multifidus, erector spinae and rectus were activated half as much with YL
- External obliques activated equally
- https://www.youtube.com/watch?v=2EGTETc5oFU


- 3 patient case series – all improved significantly in pain, function & hip abduction strength
- Pts age 78-85
- 11-17 visits over 8-10 weeks
- 10 exercises
  - Ab bracing with marches
  - Bridge with t-band and segmental lowering
  - Supine Hip abduction and extension on chair
  - Clamshell, tandem balance
  - Lateral swiss ball exercises with hips all presses, hip hike

What about the Hamstrings?

  - Significant difference in hamstring flexibility
- Fatima G, 2017
  - Showed a statistical significance between hours of sitting and hamstring tightness

- 3 x/week for 10 weeks
- 60 second hold
- 3 times
- 7-8 on pain scale for hold
- Once per week with supervision
- Older group stretched to same extent as younger group: 9.5 degrees
- They started with tighter hamstrings than young


Protocol for both
- 5 days per week for 2 weeks
- 10 second breaks between
- **Classic stretch**
  - 60 sec, 3 times
- **Neurodynamic stretch**
  - 30 reps of 3 sec

- Static stretching and neurodynamic mobilization were equally effective in improving the hamstring flexibility in elderly subjects.

Summary

Low Back Pain/Lumbar Stenosis

- Examine
  - Oswestry
  - Assess the core and Lower extremities
- Interventions –
  - Mobilize hip and back
  - Stretch RF, L – spine and iliopsoas, hamstring
  - Strengthen hip and core
  - Biking program

80% of older women preferred death to a “bad” hip fracture


- Before fracture, participants were indep. but the level was ↓.
- After Fx, much ↓ level due to fear and pain and dependence on others
- Patients living back in the community after Fx had ↑ pessimism that contrasted with optimism expressed by pts still in the inpatient phase of rehab.

Examination

- LEFS
- Sock Test


- Reliable and Valid
- The ↑ the score the ↑ the function
- MCID = 6pts (Wang, PT, 2009)


- Excellent responsiveness in total joints, OA, hip fracture & RA
The Sock Test

- Reliable and valid for persons with hip and or back pain ages 40-85
- Good sensitivity
- With 2 as the cut off, there is a 6 times greater likelihood of perceived functional difficulties after 1 year

Sitting on a bench, person instructed to lift one leg and try to grasp the toes with both hands

- 0 – can grab toes on both sides with ease
- 1 – can grab toes with fingertips but performs action with effort
- 2 – can reach beyond the malleoli but cannot reach toes
- 3 – can hardly, if at all, reach as far as malleoli


Bennell K, et al. Measures of physical performance assessments: Self-Paced Walk Test (SPWT), Stair Climb Test (SCT), Six-Minute Walk Test (6MWT), Chair Stand Test (CST), Timed Up & Go (TUG), Sock Test, Lift and Carry Test (LCT), and Car Task. Arthritis Care Res (Hoboken). 2011.


Suggests evaluation based treatment targeted toward impairments (weak hip abductors, quadriceps, gait deviations, knee pain)

Phase 1

- Begin PO Day 1 to OPPT 2-3 d/week
- WBAT assistive device
- A/PROM LE with focus on Knee Extension
- Modalities- pain, muscle stim, edema
- PRE- Quad, distal LE, SLR- all planes, hip ABD
- Bal/ Proprioception/ Gait with Assistive Device
Phase 2
- Initiated when full knee extension, 50% quad and hip abduction strength, 50% WBAT, minimal knee effusion
- PRE knee extension-90-30 degrees with weight, heel/toe raises/mini squats/resisted hip
- Stationary bike, pool


Phase 3
- Initiated when FWB with or without Assistive Device, minimal knee effusion, good quad and hip abduction strength
- PRE to all LE muscles
- FWB activities- step ups, single leg squats, closed chain
- Balance on dynamic surfaces
- Treadmill walking, jogging and conditioning


- Upper body exercise program ↑ aerobic, balance and function
- 2 MWT, BBS (81 y/o av. age)
- 3x/week used UBE with rehab (Control – just rehab)
- 5 min warm up and cool down, 20 min endurance phase, 60% VO2 max
- Tested 48hrs after admission and 1 months after rehab

- In community-dwelling frail older patients with hip fracture
- 6 month, 3x/week – RCT
- PRE and aerobic – see next slide
- Improved function & QOL compared with low intensity HEP

Progression of Extended Program

- “Very few patients were able to perform a PRE program initially”
- **First month = Phase 1** (Phase 1 and 2 available from author a few exercises in your handout)
- **Aerobics (bike or treadmill) 5 – 15 minutes**
- **Progressed to phase 2 when phase 1 safe and easy**

<table>
<thead>
<tr>
<th>Phase 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRE added (65% 1RM)</td>
</tr>
<tr>
<td>Knee ext, flex, bench press, seated row, leg press, bicep curl</td>
</tr>
<tr>
<td>1-2 sets of 6-8 reps progressing to 3 sets of 8-12 reps at 85% 1RM</td>
</tr>
<tr>
<td>Shortened version of phase 1 exercise &amp; aerobics as warm-up</td>
</tr>
<tr>
<td>All phase sessions 45-90 min</td>
</tr>
</tbody>
</table>

Mangione KK, et al. Can elderly patients who have had a hip fracture perform moderate- to high-intensity exercise at home? Phys Ther. 2005 (similar study in JAGS 2010)

- PT given in the home 2x/week for 12 weeks after patients completed home PT. Both aerobic and strength training group improved in function (gait, balance, strength)
- **Strength – 80% 1RM, 3 sets of 8 on Mini-Shuttle (hip ext, abd, knee ext and P/F)**
- **Aerobics – 65-75% of age predicted HR for 20 minutes**

Summary – Hip Fracture

- **Examination**
  - LEFS
  - Sock Test
- **Intervention**
  - PRE
  - Aerobic
  - Protocols: Patterno, Binder, Mangione
Generalized weakness in the Older Adult
A common sequela

Muscle Weakness and Disability

- Longitudinal study of 8,725 older adults > 65
  - Odds of the onset of ADL disability was 54% higher in weak individuals
  - Odds of progression of ADL disability was 2.16 x higher in those weak at baseline

Do older adults develop positive adaptive responses to resistive training?

YES


Muscle Adaptations – “No Nonresponders”

- 195 older adults performed 12-24 weeks of resistive training
- Despite variable responses, **ALL participants improved** in one or more:
  - Lean body mass
  - Muscle fiber size
  - Strength
  - Chair stand test
Examination

• Sarc F
• Dynamometry


• SARC-F scores of > or = to 4 have ↑ risk of adverse outcomes
  – hospitalization and mortality

Measuring Strength

<table>
<thead>
<tr>
<th>Manual Muscle Test</th>
<th>Hand-held Dynamometry</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Grades &gt; 3/5 unreliable</td>
<td>• Objective measurement</td>
</tr>
<tr>
<td>• Overestimates strength</td>
<td>• Correlates with gold standard testing</td>
</tr>
<tr>
<td>• ↓ Justification for interventions</td>
<td>• Accurately defines level of impairment</td>
</tr>
</tbody>
</table>
Meta-analyses of resistive training in older adult show:

The only variable significantly associated with increased strength gains was **INTENSITY**


**↑ intensities = ↑ functional performance**

**EXERCISE INTENSITY**

---

**Definition:** The maximum amount of weight that can be lifted through full ROM one time = **1RM**

**Methods to calculate:**

- **Trial and error**
- **Rating of perceived exertion**
- **Use of prediction equation – multiple exist**

**One Rep Max Calculator - 1RM Lift Log**

Weightlifting 1RM Calculator
Charles Vanderhoff

Methods to calculate:

- **Trial and error**
- **Rating of perceived exertion**
- **Use of prediction equation – multiple exist**

**Marques EA, et al.** Effects of resistance and aerobic exercise on physical function, bone mineral density, OPG and RANKL in older women. Exp Gerontol. 2011

- **Randomized to resistance, aerobic or control**
- **Community-dwelling adults age 65-83, N = 71**
- **Resistance training 3x/wk x 32 wks**
- **Progressed to 75-80%**
- **5 minute warm-up and cool-down, walking and stretching, 30-40 mins resistive training**

- 24 frail adults, 86-95 yrs
- Intervention 2x/week for 12 weeks
- Randomized to power group or control (standard ex)
- Intervention improved TUG (dual and single task), chair rise, balance, falls


- Pilot study – pre-frail and frail residents of ALF
- Twelve 30-minute HIWT sessions over 5 weeks
- HR maintained at 70-80% HR max
- Borg 15-17/20

Overground training – Obstacles
- Compliant surfaces, outdoor gait, multi-directional, stair climb


Overground gait training
- Obstacles
  - Compliant surfaces
- Outdoor
  - Multi-directional (backwards, lateral)

Stair climb included in all sessions
Feasibility and Impact of High-Intensity Walking Training (HIWT)

Statistical improvements found for:
- Frailty classification
- Fast gait speed
- 6 minute walk test
- Berg

Participants transitioned to lesser walking devices.

Resistive training:
- Used squat machine
- 2 warm-up sets at moderate intensity (10-12 reps)
- 4 sets of 85-90% 1 RM – 4 repetitions
- Eccentric phase stopped at 90° knee flexion
- Concentric phase performed as fast as possible
  - In practice, speeds were slow due to heavy load.

Summary
- Examination
  - Dynamometry
  - Sarc F
- Interventions
  - Warm up
  - Balance and gait
  - PRE
    - 1RM
    - HIWT

Gait and Balance

Age-related changes in balance performance
By: Balogun J. Disability and Rehab Vol. 16 1994

Conclusion – performance with eyes open and eyes closed:
• Males peaked at the 3rd decade of life
• Females at the 4th
• Both progressively declined thereafter

Examination
Tools for assessing fall risk in the elderly: a systematic review and meta-analysis; Park, Again Clin Exp Res; 17
Concluded that rather than one tool, two assessment tools would better evaluate the characteristics of falls in older adults

Hopkins Fall Grading Scale
- Compared video vignettes of people falling. Healthcare professionals and volunteers rated and categorized the falls using this scale.
- 4 point scale – demonstrates good face and content validity, and high inter-rater reliability
- Designed to facilitate the standardization of falls reporting.

VST Items
- Good reliability, validity and 84% sensitivity and specificity
- A score of 4 or greater = likelihood of vestibular disorder
- Answers
  • Yes = 2
  • Sometimes = 1
  • Never = 0


- Good concurrent validity and clinical acceptability
- Sensitivity – 100%
- Specificity – 83.3%
- 1 point for all “yes” answers
- 2 pts for “yes” to questions 1 & 5
- 13 questions

Fall Risk Questionnaire Items (yes/no response option)
1. I have fallen in the last 6 months.
2. I am worried about falling.
3. Sometimes, I feel unsteady when I am walking.
4. I steady myself by holding onto furniture when walking at home.
5. I use or have been advised to use a cane or walker to get around safely.
6. I need to push with my hands to stand up from a chair.
7. I have some trouble stepping up onto a curb.
8. I often have to rush to the toilet.
9. I have lost some feeling in my feet.
10. I take medicine that sometimes makes me feel light-headed or more tired than usual.
11. I take medicine to help me sleep or improve my mood.
12. I often feel sad or depressed.
13. Because I don’t see well, I have difficulty avoiding hazards in my path, such as tree roots or electrical cords.

Fall Risk = Total score over 4


If the person is unable to balance for 5 seconds = risk for INJURIOUS falls.

TUG Scores per Decade

- 3-5th decade – (4.4, 4.6 & 4.9s)
- 6th decade – 5.6s
- 7th decade – 6.7s
- 8th decade – 7.8 s

Cut off of 10 sec is proposed for balance dysfunction
- All adults should score 10s or less

OLST training is effective in ↓ falls

- RX
  - Eyes open
  - Stand on each leg for 1 minute
  - 3 x / day


If the person is unable to balance for 5 seconds = risk for INJURIOUS falls.
**Balance and Gait Interventions**


**Best programs**
- Higher dose >50 hrs
- Combination programs

**Otago Exercise Program**
- Individual 1 year prescription
- Calendar to record 3x/week home ex
- Exercises:
  - 5 Warm up
  - 5 strengthening
  - 12 balance
- Thomas S, et al. Does the 'Otago exercise program reduce mortality and falls in older adults?; a systematic review and meta-analysis. Age Ageing. 2010
  - 1500 participants- significantly reduced risk of death and falls

**Vestibular Rehab is the Rage...**
- Can use for evaluation and treatment
  - Test Symptoms in each task
  - Prescribe to tolerable point of symptom development
  - Practice to symptom development at home and monitor at every visit in clinic
- www.dizziness-and-balance.com

- PRE to hip ext, hip abd, knee flex & ext, ankle plantar and dorsiflexors
- OLST, tandem stands, tandem walking
- Walk on heels, backwards, sideways, turns
- Stepping over objects, stair climbing
- Picking objects off the floor, sit/stands
- Knee squats, AROM whole body
- Also HEP 3x/week

- Age 70-92; 37 in study
- Improved on all balance measures
- 3 x/ week/ 6 weeks, 45 minutes
- 15 min warm-up (treadmill then stretch)
- LE Proprioceptive training
- Vestibular training
- Fall prevention movements
- Intervention improved postural control, function, confidence and risk of falls.

Standing on foam
- Shift weight side to side
- Shift weight back and forth
- Move arms different directions
- Stamp feet
- Reach up, down, side to side
- Move head up and down
- Move head side to side
- Step responses – CLOCK STEPS
- Step forward & back quickly
- Step side to side quickly
- Push different directions while standing and walking

Application- Case Study
- In clinic
  - warm up on bike 5 min, soft tissue and mobilization to L-spine, quad, hamstring then L-spine stretch.
  - Begin lumbar stabilization and Kim/ Backstrom protocol
  - Clock stepping postural reactions in clinic and then as an HEP
  - PRE to LE weak muscles

Summary
- Examination
  - Assess components
    - Fall type – Hopkin’s FGS
    - Self-report – FRQ
    - Vestibular – VST
    - Static/ Dynamic – OLST – TUG
- Interventions
  - Yardley – vestibular
  - Static – OLST, PRE to LE, BOS
  - Dynamic – Okago, High Intensity PRE, Reykjavik model

Home Program- Case Study
- Hamstring and quadriceps stretch 4x/ 60
- Tandem walking
- Progressive one-legged stand
- Exercises from Backstrom Protocol
- Biking program
Conclusion

- We hope you have some new evidence based ideas
- We hope you see the challenge and joy that you can get from working with your older patients
- There is so much you can do that is effective
- So.........
Are You Undertreating 40% of Your Patients Case Study

Anita Break a 73-year-old woman who started having pain in her low back two years ago. She increased her walking/jogging from 30 minutes daily to an hour. Two months later she tore her left hamstring. She heard and felt a pop which was very painful. About a month after the hamstring tear, she tried striding out and her hamstring spasmed and she fell and broke right hip. That was a year ago. She had surgical repair of the hip and has recovered from that but she still has pain in her back and she was told she has lumbar stenosis. She is concerned about the pain, and possibility of falling again and she claims to feel weaker in her lower body especially on that right side.

What are crucial to tests- tell your partner 3

Some objective measures

Strength and Motion

- Hamstrings- Left (L)- 67 degrees, Right (R)- 85 degrees
- Hip Abduction- R- 28#, L-32#- Norms- 38#
- Knee Extension- R-36#, L-41, Norms- 50#
- Knee Flexion- R-32#, L- 19# (limited by pain) Norms- 35#
- Plank- 73 seconds- norms for 60-79 124 seconds
- Back Extension- 75 seconds- norms for persons without back pain- 128 seconds
- Sock Test- 3 bilaterally
- OLST- R-3 and L seconds 9, Tandem eyes closed – 0 steps, eyes open-5 mistakes
- Endurance-2MST- 111- (norms- 93)
- TUG – 6.5 (norms- 5.6) STS- 11 times (norms- 15)
- STS- 11 times (norms 15)

Pain – Low back -2-8, hamstring area pain-0-9

Based on these findings tell your neighbor 3 interventions you would suggest based on the above.
Lumbar Spinal Stenosis Exercises

Biking Protocol

Weeks 1 and 2, participants cycled at their comfortable pace 50 to 60 rpm. Participants were instructed to assume flexed posture and avoid lumbar extension while cycling. Weeks 3 to 6, participants are encouraged to exercise at a moderate intensity and the duration of each cycling session is limited by participant tolerance or to a maximum of 30 minutes.

Exercises -

Single knee to chest: Starting with both knees straight, using your hands pull one knee to your chest and hold for 60 seconds. Do this, 3 times on each side.

Lumbar stabilization: with knees bent and feet flat rotate your hips and pelvis backward to flatten your lower back using your tummy muscles. Hold this, 10 seconds repeat 20 times building to 50 or hold 2 minutes building to 5 minutes.
Rotation stretch - Lying on your side, or if possible, on your back with your top knee as far over your straight leg until you feel a comfortable stretch in your back or hip. Hold this stretch 60 seconds – 3 times on each side.

Rectus stretch - Lying on your tummy with a pillow under it and a band around your ankle pull the strap that is over your shoulder until you feel a stretch along your thigh or into the front of your hip. Hold this stretch 60 seconds – 3 times on each side.
**Iliopsoas Stretch** - Place one foot on the center of a sturdy chair seat. Then lean forward at the hip of the straight leg until you feel a stretch in the front of that hip. Hold this stretch 60 seconds – 3 times on each side.
Sample of the exercises from Binder for persons with hip fractures

PHASE ONE

Sitting
1. Chin tucks, trunk twists,
2. Ball toss
3. Theraband diagonals

Standing
1. Wall slides- back and arms above 90 degrees to the wall
2. Toe- Heel raises/ Calf stretch

Floor Exercises
1. Prone props, and opposite arm and leg raise
2. Sidelying hip abduction, quadriiceps sets, hip and knee stretch
3. Supine Hamstring, iliopsoas stretch, upper and lower ab work

Standing
1. Tandem walk
2. One leg standing

PHASE 2

Sitting
1. Upper and lower body PRE with weights and Theraband
2. Sitting up and down with holds half way and slow lowering

Wall Exercises
1. Wall slides and holds
2. Back against the wall with movement
3. One leg stand with big excursion of hip extension – side to wall

Effects of Extended Outpatient Rehabilitation After Hip Fracture; A RCT; Binder; JAMA; 8-04
Muscle power training  
Cadore et al, 2014

2 times/week, 12-week intervention

Warm up/cool-down, 5 minutes each:
- Resistance training at very light load
- Stretching

Resistance training (20 minutes)
- 8-10 repetitions, 2 sets, 40-60% 1 Rep Max, high velocity for all sets
- Leg extension
- Knee extension
- Seated bench press

Balance and gait (10 minutes)
- Semi-tandem foot standing
- Line walking
- Stepping practice
- Step over small obstacles
- Stand/walk on unstable surface
- Altered base of support
- Weight shifting
A sample of the sample given in the appendix for the Reykjavik Model for multisensory balance training

Exercises are done in bare feet

Focus on weight distribution - The four corners of the foot

**Proprioceptive training**

Standing

1. Sense weight distribution in feet, weight shift side to side, forward and backward
2. Move arms different directions and stamp feet
3. When 1-2 are easy- try on foam, Balance board or trampoline

**Vestibular training**: begin sitting, when able to complete 20 reps, do standing

1. Head movements- eyes open and closed progressing to fast
2. Head movements with gaze

**Combined Vestibular and Proprioceptive training**

1. Reaching, catching a ball
2. Keeping a balloon in the air
3. Quick turns
4. Work on rotational chair and disc

**Fall Reaction training**

1. CLOCK STEPPING
2. Quick stepping different directions
3. Pushed unexpectedly while standing and walking

Effect of multi-sensory balance training for unsteady elderly people: the Reykjavik Model; Kristinsdottir; Dis & Rehab; 13
Case Study- Anita Break- Possible Answer

Week one

Begin progressive biking program 10 minutes and increase 2 minutes/ day

Begin nerve flossing in clinic and at home

Only sit for 10 minutes at a time. Get up and move the trunk

Hamstring stretch 4x/ 60 in clinic - and at home - begin with active, try passive to see which works better

Begin quad stretch, tandem walking and progressive one-legged stand at home

In clinic warm up on bike 5 min, soft tissue and mobilization to L-spine, quad hamstring then L-spine stretch.

Begin lumbar stabilization and Kim/ Backstrom protocol

In two weeks add Hip abduction PRE, Knee extension PRE

Back extension strengthening while maintaining abdominal contractions

Clock stepping postural reactions in clinic and then as a HEP

In four weeks add knee flexion PRE, begin slow progressive walking program with HIT.

See patient 3x/week 2 weeks, 2x/week, 2 weeks, 1 x/week 2 weeks, every other week 1 month. 1 x/month 2 months.

Exercises for home

Week 1- flossing left leg, Begin and progress Backstrom/ Kim exercises, bike 5-10 minutes, Increase complexity of balance exercises- backward walking, OLST on foam

Week 2- above add HS stretch - hip abduction PRE (supine), Bike 10-20 min

Week 3- above add Quad stretch, L-sp stretch- Bike 20- 30 minutes

Week 4- above add prone extension - Combine biking with HIT walking

Week 5- above add knee PRE- step ups - Continue and progress bike/ HIT

Week 6-18- Progress core/ balance/ PRE-program and stretch - Continue and progress bike/ HIT (High Intensity Interval Training)
References for R U Undertreating


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Shubert TE, Goto LS, Smith ML, Jiang L, Rudman H, Ory MG. The Otago Exercise Program: Innovative Delivery Models to Maximize Sustained Outcomes for High Risk, Homebound Older Adults. Front Public
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